



Bone Pelvis and its Morphofunctional Features in Sexual Somatotypes in a Series of Female Athletic Sports

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Abstract

Based on the analysis and generalization of the literature sources, as well as the results of the pedagogical experiment, the article presents data on the morphofunctional features of the pelvis in young athletes who are engaged in athletic sports. The presence of an anatomically narrow pelvis in the large group of female athletes participating in the study, with the I-II degrees of its narrowing, as well as various variants of morphofunctional changes in the structure of the pelvis of the athletes, often combined.

Keywords: Female Athletes; Juvenile Age; Athletic Sports; Bone Pelvis; Narrow Pelvis; Pelvimetry; Morphofunctional Changes; Sex Somatotypes

Abbreviations

SDI: Sexual Dimorphism Index; ShW: Indicators of Shoulder Width; PW: Indicators of Pelvic Width; CMS: Candidate for the Master of Sports; MS: Master of Sports; SFP: Simple Flat Pelvis; ATUNP: Total Uniformly Narrowed Pelvis; MPSH: "Mixed" Pelvic Shape (Pelvis-Unisex)

Introduction

Any research works concerning medico-biological features of female sports in ontogenesis, and especially in native male athletic-force sports, are always topical and in demand [1-13]. A large number of researchers, both native and foreign, are studying the morphofunctional and anatomical-anthropological changes in female athletes, including those of adolescent age. Especially relevant, in my opinion, is the study of adaptive mechanisms in female athletes engaged in primarily male sports, such as weightlifting, weightlifting, powerlifting. When analyzing the available informa-

tion sources on the problem under study, we found that there are almost no works concerning the study of the pelvic bone formation and adaptive changes in female athletes in athletic sports. In this regard, our study is an attempt to fill this information gap.

Aim

In this regard, the purpose of our study is to determine the available anatomical and morphofunctional indicators in female athletes of different gender somatotypes engaged in such athletic sports as weightlifting, weightlifting and powerlifting.

Materials and Methods

To achieve the purpose of the study we used a complex of scientific methods, including the analysis of available scientific and scientific-methodological sources of information, determination of anatomo-anthropometric and morphofunctional values in female athletes, interviewing. The measures aimed at determining the values of the sexual dimorphism index (SDI) in the studied groups of

female athletes, with the definition of anthropometric indicators of shoulder width (ShW) and pelvic width (PW), with the subsequent allocation of female athletes to the gender somatotypes according to the J. Tanner classification were carried out.

We also performed pelvimetry according to the classic method, determining 3 transverse and 1 longitudinal dimension of the bone pelvis [2; 3; 4; 18; 11]. After obtaining the pelvimetry data, the existing changes in the size of the bony pelvis, its anatomomorphological changes and the degree of pelvic narrowing were determined in female athletes, in accordance with the Litzman classification of narrow pelvis, mathematical recalculations of the pelvimetry data necessary for determining the true conjugate (c. vera), the values of which were used to determine the degree of pelvic narrowing or its normal values [2; 8; 11].

Results and Discussion

In our experiment was attended by female athletes of young age, engaged in weightlifting (n = 18), weightlifting (n = 13), powerlifting (n = 17), total - 48 female athletes. The average age of the female athletes was 19, 43 ± 0.46 years, which corresponds to adolescent age [5; 11]. The training experience in these kinds of sports was from 3 to 9,5 years. The level of sports qualification of sportswomen was from the I class to the candidate for the master of sports (CMS) and master of sports (MS). The intensity and frequency of training is 4-6 times a week, from 1.5 to 2.5 hours per session.

According to the anthropometric measurements of the width of the shoulders (WSh) and the width of the pelvis, we got the following values: the female athletes in kettlebell lifting (n = 13), WSh was 36.64 ± 0.77 cm, and the width of the pelvis - 27.67 ± 0.34 cm. For female weightlifters, the WSh was 36.47 ± 0.44 cm and the PW was 27.14 ± 0.77 cm. In the group of powerlifting female athletes, the values of the WSh were 35.78 ± 0.63 , and the PW was 26.85 ± 0.82 cm. Using the obtained data of WSh and PW we made calculations of SDI values according to Tanner's classification, with the definition of gender somatotypes [4; 6; 7; 8; 9; 10; 13; 14; 15; 16] in female athletes of the 3 studied groups. As can be seen from the values of anthropometry, the mean values of WSh in all three studied groups ($p \leq 0,05$) significantly exceeded the values of PW, with values in all groups less than anatomically acceptable value of 28-29 cm [2; 8; 11]. This type of WSh/PW ratio indicates a masculine

type of figure in female athletes of all three groups [3; 5; 6; 7; 9; 10; 11; 12; 13].

The distribution of female athletes by gender somatotype is as follows: in female athletes in weightlifting (n = 13), gynecomorphic gender somatotype was not determined, mesomorphic somatotype was determined in 9 (69.23%) female athletes, and andromorphic somatotype - in 4 (30.77%) female athletes.

In weightlifters (n = 18) girls with gynecomorphic sexual somatotype were also not identified. The number of athletes with mesomorphic somatotype in this group is 12 (66,67%), with andromorphic somatotype - 6 (33,33%) female athletes.

In powerlifting gynecomorphic sexual somatotype was determined in 1 (5.88%) female athlete, mesomorphic sexual somatotype - in 13 (76.47%) female athletes, and andromorphic sexual somatotype - in 3 (17.65%) female athletes. In all three groups, athletes classified as mesomorphic sexual somatotype prevail - 34 (70.83%) and andromorphic sexual somatotype - 13 (27.08%) athletes engaged in athletic sports.

According to pelvimetry data, the following values of bone pelvis and their changes were obtained: normal pelvic dimensions were determined only for one (2.08%) athlete out of 48 studied, anatomically narrow pelvis, with a decrease of 1 or more dimensions [2; 8; 11] - for 47 (97.92%) all studied female athletes from the three groups.

Simple flat pelvis (SFP) was determined in 2 (15.39%) female athletes from the group of girls engaged in weightlifting, in 3 (16.67%) female weightlifters and in 2 (11.77%) female athletes engaged in powerlifting. Total uniformly narrowed pelvis (TUNP) [2; 8; 11] was determined in 1 (7.69%) female weightlifter, 2 (11.11%) female weightlifters, and 3 (17.65%) female powerlifters.

The data on the identified degrees of pelvic bone narrowing are as follows: in the group of weightlifters (n=13), degree I narrowing was identified in 4 (30.77%) female athletes, and degree II narrowing was identified in 2 (15.39%) girls. In the group of weightlifters, degree I narrowing of the pelvis was determined in 3 (16,67%) female athletes, and degree II narrowing in 1 (5,56%) female athletes.

In powerlifting group the I degree of pelvic constriction was determined in 4 (25,53%) female athletes, the II degree of pelvic constriction - in 2 (11,77%) female athletes. Furthermore, a unisex or mixed pelvis [8; 13] was determined in 7 (53.85%) weightlifters, 11 (61.11%) weightlifters, and 10 (58.82%) powerlifters.

The greatest number of anatomical and morphological changes in the structure of the pelvis and I-II degrees of its constriction was determined in female athletes of all three groups, with mesomorphic sexual somatotype determined in them, as well as, to a lesser extent - in female athletes from the group with andromorphic sexual somatotype.

In the groups of female athletes engaged in kettlebell lifting and powerlifting the same number was determined - 6 female athletes each with degrees of pelvic constriction, but their number is dominated by female athletes in kettlebell lifting - 46.15% and 35.19% in powerlifting.

Conclusions

- In all three groups of athletes mesomorphic sexual somatotype prevails - in 34 (70.83%) athletes and andromorphic sexual somatotype - in 13 (27.08%) female athletes.
- A simple flat pelvis was determined in 2 (15.39%) female athletes from the weightlifting group, in 3 (16.67%) female weightlifters and in 2 (11.77%) female powerlifters.
- A generally uniformly narrowed pelvis was determined in 1 (7.69%) female weightlifter, 2 (11.11%) female weightlifters, and 3 (17.65%) female powerlifters.
- In female athletes of all three studied groups, I-II degrees of pelvic constriction were determined in girls with mesomorphic and andromorphic gender somatotypes.
- Six female athletes (46.15% and 35.19%) with pelvic constriction degree I-II were found among female youth athletes involved in kettlebell lifting and powerlifting.
- "Mixed" pelvic shape (pelvis-unisex) was determined in 7 (53.85%) female weightlifters, 11 (61.11%) female weightlifters, and 10 (58.82%) female powerlifters.
- The indices of anatomical and morphofunctional changes of the bone pelvis and degrees of their contraction, on the background of the inversion of values of sexual dimorphism in all three groups, towards mesomorphic and andromor-

phic sexual somatotypes in female athletes, engaged in athletic sports, give reason to think about significant adaptive changes in the organisms of young female athletes, caused by intense physical exertion.

Conflict of Interest

The author notes the complete absence of any conflicts of interest.

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